DOCUMENT RESUME

ED 419 528 IR 019 152

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TITLE	Technology Planning and Implementation in Public Schools: A Five-State Comparison.
PUB DATE	1998-04-00
NOTE	20p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Diego, CA, April 13-17, 1998).
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Administrators; *Educational Administration; *Educational Planning; *Educational Technology; Elementary Secondary Education; Leadership; *Public Schools
IDENTIFIERS	Technology Integration; *Technology Plans; *United States (Southeast)

ABSTRACT

The purpose of this study was to examine the differences in technology planning and implementation among schools in the southeastern United States. School administrators (294) from five southeastern states (Alabama, Florida, Georgia, Mississippi, and Tennessee) were surveyed to determine technology planning procedures they had completed, whether they had technology leaders employed in their district, and technology they were planning to implement. Results of the study indicated (1) wide differences in technology leadership positions available in schools and in technology currently implemented in schools among the five states surveyed and (2) that support and resources, particularly at the state level, can have a huge impact on the availability of technical resources in these schools. Without this support, schools located in states with less progressive leadership will continue to have inadequate resources available for their students, which in turn will significantly diminish the competitiveness of these students in the 21st century marketplace. (AEF)

TECHNOLOGY PLANNING AND IMPLEMENTATION IN PUBLIC SCHOOLS: A FIVE-STATE COMPARISON

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Paper Presented at the Annual Meeting of the American Educational Research Association, April, 1998, San Diego, CA

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Keywords: Technology, Planning, Survey

RUNNING HEAD: TECHNOLOGY PLANNING

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TECHNOLOGY PLANNING AND IMPLEMENTATION IN PUBLIC SCHOOLS: A FIVE-STATE COMPARISON

INTRODUCTION

Over the past two decades, technology has become increasingly prevalent in our schools. Ely (1996) has noted that the student/computer ratio in K-12 institutions in the United States has dropped from 1/75 in 1984 to less than 1/12 today. More schools have access to network resources and the internet than ever before. Heavside, Farris, Malitz, and Carpenter (1995) report that 75% of K-12 schools have access to network resources, with 30% of elementary schools and 49% of high schools having internet access. Nearly 75% of schools have access to cable television, and all but 2% have access to video cassette recorders (Quality Educational Data, 1995). Computers and other technology tools are being used in schools today for everything from presenting content to providing supplemental instructional activities to assisting staffs with school administrative duties.

With this influx of technology comes both opportunities and problems. Technology provides the potential for new methods of teaching and learning in our schools. Technology integration in K-12 institutions has had a direct impact on virtually all educational reform initiatives (Ely, 1996). In a survey of school superintendents in Virginia, Bailey (1990) reported that over 82% of respondents believed that technology would bring about excellence in education. Both the U.S. Department of Education and the

National Education Association have stressed the importance of incorporating educational technology in our schools (Ely, 1996; Office of Technology Assessment, 1995).

Rationale and Purpose

While there is a multitude of data regarding technology currently available in schools, there is little information detailing the types of planning and personnel resources available, and how those resources impact technology implementation. Further, while there are large differences in state support and resources, particularly in the southeast, there is little data regarding the impact these resources (or lack thereof) are having on technology implementation and personnel decisions.

The purpose of this study was to examine the differences in technology planning and implementation among schools in the southeastern United States. Specific research questions addressed in this study included: (1) Are there differences in technology planning documentation and leadership personnel available among schools from different states?: (2) What types of instructional technology do school leaders believe need to be implemented in schools within the next five years?; and (3) Are there differences in technology implementation in schools from different states?

METHOD

Subjects

Two-hundred and ninety-four school administrators from five southeastern states participated in the study. A majority of the subjects (52%) had greater than 15 years of experience as school administrators. Subjects' roles in their schools included superintendents (50%), assistant superintendents (18%), instructional technology directors (20%). and various other administrative positions (11%). Seventy-three percent of the subjects were male, and 26% were female.

A variety of information was provided by subjects regarding their school locations and socioeconomic status. Of the five states included in the study, 31% of the respondents

were from Georgia (n = 93), 23% were from Alabama (n = 67), 21% were from Mississippi (n = 62), 15% were from Tennessee (n = 44), and 10% were from Florida (n = 28). Sixty-six percent of subjects were from rural schools, and 79% had student enrollments of less than 7500 students. Fifty-five percent of subjects worked for schools which had less than a $4000 per pupil expenditure, and 54% worked for schools where over 40% of students qualified for free or reduced lunch.

In terms of technology, 88% of subjects stated that their schools had at least one computer in every classroom. When asked about personal experience with instructional technology, 7% claimed they were "expert," 26% stated they were "very knowledgeable," 59% had "some knowledge," and 9% "knew very little" about instructional technology.

Design

In order to determine if any demographic variables resulted in different survey responses from group members, a series of chi-square analyses were conducted on the survey data. Three independent variables were examined: written technology plan in place, technology director currently employed, and state in which district resides. All variables were operationally defined as subject responses to the survey question corresponding to the variable. The dependent variables were defined as subject responses to 26 survey items dealing current and future technology implementation.

Materials

A 62-item survey instrument was designed for the study. This instrument was designed by a team of experts in the field of educational technology. Prototypes of the survey instrument were reviewed periodically by several school superintendents and administrators. Feedback from their reviews was used to improve the survey.

The survey was divided into three sections. The first section contained 12 items dealing with subject and school background information (role in school, years of experience, school size, school location, etc.). The second section contained 24 items and dealt with current and future technology implementation (see Table 1). These items were

culled from discussions among the survey design team, as well as discussions with current technology leaders in local schools. Subjects were asked to describe the current and future technology implementation plans for their districts by responding to each item in the list with one of the following choices: (1) currently in place, (2) plans to acquire within 5 years, (3) does not plan to acquire within 5 years, (4) not sure.

Insert Table 1 about here.

The third section contained 26 items dealing with potential skills and experiences of technology leaders. These data were incorporated into a separate study (Brush & Bannon, in press).

Prior to its full distribution, the survey instrument was piloted with a group of 20 school administrators. This pilot group completed the survey and provided additional comments regarding potential additions, deletions, and other improvements to the survey items. The pilot data were used to make further improvements to the survey instrument. These data were not included in the final analysis.

Procedure

Survey packets, which contained a cover letter explaining the study, the survey instrument, and a postage-paid return envelope, were mailed to the superintendents of every school district in five southeastern states (n = 640). The cover letter requested that the superintendents complete the surveys and mail them back in the postage-paid envelope. The cover letter also stated that if the superintendents did not have time to complete the survey, they should forward it to an appropriate administrator in the district (e.g. assistant superintendent, instructional technology director, school media specialist).

The subjects were asked to return the survey within six weeks. Four weeks after the surveys were distributed, follow-up postcards were sent to all of the superintendents reminding them of the deadline.

RESULTS

A total of 294 surveys were returned, which represented 46% of potential respondents. Seventeen survey packets (3%) were returned unopened due to incorrect address or school information.

Analysis of survey data was conducted in three areas. First, the technology planning variables (written technology plan in place, technology director currently employed) were compared by state to determine differences in schools' readiness for technology implementation. Second, overall percentages for each survey item were calculated and ranked in order to determine the technology most prevalent in schools. Finally, chi-square analyses were conducted on each survey item in order to determine differences in technology implementation by state. Each of these analyses are described below.

Technology Planning

Figures 1 and 2 show differences in written technology plans completed and technology leaders currently employed by state.

Insert Figures 1 and 2 about here.

In terms of written technology plans, there were only slight differences between survey respondents from the various states included in the study. Alabama had the lowest

percentage of respondents stating that their districts had written technology plans currently in place (88%), while Georgia had the highest percentage (99%). A chi-square analysis of these data revealed no significant differences between states, $\chi 2$ (4, $\underline{N}$ = 294) = 12.75, $\underline{p}$ = .12.

Responses to whether a technology leader was employed in the district revealed greater differences among the states included in the study. Only 69% of respondents from Alabama stated that their district currently had a technology leader/director employed, compared to 74% for Florida, 77% for Mississippi, 99% for Georgia, and 100% for Tennessee. A chi-square analysis of these data revealed significant differences between the states, $\chi 2$ (4, $\underline{N}$ = 294) = 41.41, $\underline{p} < .001$.

Technology Most Prevalent in Schools

Refer to Table 2 for a summary of responses to each of the survey items. The data are presented as percentages.

Insert Table 2 about here.

These data revealed that a majority of schools have current investments in basic technology such as televisions and other video equipment, computers, and computer labs. In addition, it appears that many schools have invested in administrative/productivity software such as automated library systems and class scheduling, attendance, and grading packages.

These data also demonstrate that school leaders believe network access and infrastructure development are important for their future technology plans. Over 97% of respondents stated that they were currently providing access to the internet for their teachers and students, or planned to provide access within 5 years. Nearly 96% of respondents

were planning to install local area networks within their buildings, and 90% of respondents were planning to build wide area networks connecting their buildings together.

Telephone access in classrooms continues to be an issue with school leaders. Only 13% of respondents stated that they currently had telephones installed in classrooms, and 31% stated that they had no plans to install telephones within the next 5 years.

Computer portability also appears to be an issue with school leaders. Only 10% of respondents stated that portable computers were available to their teachers, and only 4% stated that laptops were available to students (35% stated that they had no plans to provide laptops for students within the next 5 years).

State Differences in Technology Implementation

Table 3 presents technology currently available in respondents' schools, categorized by state. Chi-square analyses were conducted on each survey item to determine differences in current technology implementation by state.

Insert Table 3 about here.

State comparisons reveal a wide range of differences in current technology implementation. In terms of networking and internet access, while virtually all respondents stated that their districts were either planning for or implementing network infrastructures, these data show that a significantly greater percentage of districts in Georgia and Tennessee are currently "wired," particularly in comparison to districts in Alabama and Mississippi. For example, 77% of respondents from Tennessee and 75% of respondents from Georgia stated that local area networks were currently installed in their buildings, compared with 39% in Alabama, 30% in Florida, and 25% in Mississippi, $\chi 2$ (4, $\underline{N}$ = 286) = 62.3, $\underline{p}$ < .001. In addition, 82% of respondents from Tennessee and 54% of respondents from

Georgia stated that internet access was currently available for their students, compared with 46% for Florida, 36% for Mississippi, and 34% for Alabama, $\chi 2$ (4, $\underline{N}$ = 288) = 31.8, $\underline{p}$ < .001.

Computer availability to students also differed by state. For example, 85% of respondents from Tennessee, 79% of respondents from Georgia, and 71% of respondents from Florida stated that computers with multimedia capabilities were currently available to their students, compared with 52% of respondents from Alabama and 38% of respondents from Mississippi, $\chi 2$ (4, $\underline{N}$ = 281) = 46.0, $\underline{p}$ < .001. In terms of computer labs available, 80% of respondents from Georgia and 77% of respondents from Florida stated that computer labs were currently installed in their buildings, compared with 73% of respondents from Mississippi, 67% of respondents from Alabama, and 51% of respondents from Tennessee, $\chi 2$ (4, $\underline{N}$ = 281) = 21.4, $\underline{p}$ < .01.

DISCUSSION

The purpose of this study was to examine the differences in technology planning and implementation among schools in the southeastern United States. School administrators from five southeastern states (Alabama, Florida, Georgia, Mississippi, and Tennessee) were surveyed to determine technology planning procedures they had completed, whether they had technology leaders employed in their district, and technology they were planning to implement.

From a planning standpoint, the results of this study demonstrate that schools are embracing the notion that technology planning is an important process. Over 90% of the respondents indicated that their districts had written technology plans in place. This may be due to state initiatives emphasizing the need for technology planning in schools. For example, in Alabama state funding for instructional technology is tied directly to a school

district's technology plan. Funding will not be provided to schools who do not have written plans in place (Alabama Office of Technology Initiatives, 1998).

The results of this study provide some support to the idea that school leaders believe they need strong technology leaders employed in their districts, although this support varies widely by state. Only 68% of respondents from Alabama reported that their district had a technology leader/director currently employed, compared with 99% of respondents from Georgia and 100% of respondents from Tennessee! This wide disparity of results may be an indication of the support schools receive at the state level in Tennessee and Georgia as compared to Alabama. Both Tennessee and Georgia have recently provided large funding increases to schools, particularly for instructional technology. Alabama, on the other hand, has received little state support for technology initiatives. Thus, although research clearly indicates the need for technology leadership positions in schools (Brush & Bannon, in press; Carter, 1997; Davidson and Maurer, 1995; Smith, 1997), many schools do not have the financial resources needed to maintain these positions.

Results of this study revealed that school leaders considered infrastructure development and access to networked information resources important both presently and in the near future. As stated above, over 95% of respondents indicated that their districts were planning to have network and internet access for their students within 5 years. This is an encouraging trend since many leaders in the field of instructional technology believe that building a network infrastructure within and among our schools is of primary importance (Dede, 1998; Kozma & Schank, 1998; Riel, 1998). Network resources such as those available via the internet will allow our students to access information, communicate with others, and share information, in new and exciting ways. Access to this information is impossible, however, without first constructing the network infrastructure within our schools.

It is interesting to note that school leaders continue to be apprehensive with regard to telephone access in the classrooms. In this study, less than 13% of respondents stated

that their districts currently had telephones installed in their classrooms. More surprising was the fact that over 31% of respondents stated that they had no plans for providing telephone access in classrooms. It is difficult to understand why teachers continue to be denied access to one of the most basic technological applications available, one that is available to practically every other professional in the United States.

The wide differences in technology implementation among the states surveyed for this study are also of interest. As stated above, the differences can most likely be attributed to the disparity of funding available to schools in the states surveyed. Thus, it should not be surprising that respondents from states such as Georgia and Tennessee reported greater percentages of technology currently implemented (particularly with respect to more recent technologies such as internet access, networking, and multimedia) than Alabama and Mississippi. Support must come from the state level in order for technology initiatives to succeed in our schools.

Some of the data reported by respondents from Tennessee may provide insight into trends occurring in that state. Only 51% of respondents from Tennessee stated that instructional computer labs were currently installed in their schools. In addition, only 41% of respondents indicated that their district had invested in advanced computer-based instructional packages such as Integrated Learning Systems. These data may indicate that schools in Tennessee are moving towards a distributed model of technology implementation, i.e. providing technology access at the point of instruction (in the classroom) as opposed to in a contrived setting (a computer lab). The fact that 77% of respondents from Tennessee stated that their schools had local area networks installed provides support for this hypothesis, but further research in this area is needed.

In addition to the potential study discussed above, there are several other areas where further research may be appropriate. A study examining how schools use the planning documents they have developed to make instructional technology decisions would provide insight into best practices for developing and implementing technology plans. In

addition, determining skills and experiences needed by technology leaders would aid schools in selecting these individuals (see Brush and Bannon (in press) for a similar study).

As school leaders struggle with the acquisition and integration of instructional technology into their schools, individuals concerned with education need to continue to lobby federal, state, and local governments to provide additional support for instructional technology initiatives. As can be seen from the results of this study, support and resources, particularly at the state level, can have a huge impact on the availability of technological resources in our schools. Without this support, schools located in states with less progressive leadership will continue to have inadequate resources available for their students, which in turn will significantly diminish the competitiveness of these students in the 21st century marketplace.

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Table 1. List of Technology Available in Schools.

Item	Survey Item Description
1.	Telephones/voicemail in the classrooms
2.	A computer network (LAN) within each building
3.	A computer network (WAN) connecting district buildings
4.	Internet access for teachers in the district
5.	Internet access for students in the district
6.	Internet access for administrators/staff
7.	A television in each classroom
8.	The "Channel 1" video service
9.	A distributed video system (e.g. DYNACOM)
10.	A VCR in each classroom
11.	Distance learning capabilities (e.g. two-way video) between district buildings
12.	Computers with multimedia capabilities in each building
13.	Instructional computer labs in each building
14.	Integrated Learning Systems (e.g. Jostens, CCC)
15.	Electronic mail (e-mail)
16.	Electronic library catalog systems
17.	CD-ROM access in each building
18.	Laptop computers for teachers
19.	Laptop computers for students
20.	Laptop computers for administrators/staff
21.	Dial-in access to a building and/or district computer network
22.	Electronic classroom management software (grading, attendance, etc.)
23.	A satellite dish for the district
24.	Video/computer projection systems for classrooms (e.g. LCD panels)

Table 2. Current and future implementation of technology in subjects' districts.

Survey Item Description	In Place	5 Yrs	No Plans	Not Sure
CD-ROM access in each building	75.5	20.1	1	3.4
The "Channel 1" video service	71.4	3.4	15.6	9.5
A satellite dish for the district	68.7	13.3	8.5	9.5
Instructional computer labs in each building	67.7	22.4	5.8	4.1
Electronic library catalog systems	65	29.3	1.7	4.1
Electronic classroom management software (grading, attendance, etc.)	63.9	31.0	1	4.1
A television in each classroom	62.9	24.5	5.4	7.1
Computers with multimedia capabilities in each building	61.6	33	1.4	4.1
Internet access for administrators/staff	54.1	43.9	0.7	1.4
Internet access for teachers in the district	52.7	44.9	0.3	2
A computer network (LAN) within each building	50.7	45.2	1.7	2.4
Integrated Learning Systems (e.g. Jostens, CCC)	49.7	23.1	11.2	16
Internet access for students in the district	48.3	49.3	0.7	1.7
Electronic mail (e-mail)	43.9	48	1.7	6.5
Video/computer projection systems for classrooms	36.1	42.9	7.8	13.3
A VCR in each classroom	34	33.3	19.4	13.3
A computer network (WAN) connecting district buildings	27.9	61.9	4.8	5.4
Laptop computers for administrators/staff	24.5	35.7	22.4	17.3
A distributed video system (e.g. DYNACOM)	23.1	23.1	15.3	38.4
Distance learning capabilities (e.g. two-way video) between district buildings	21.8	42.5	16.7	19
Dial-in access to a building and/or district computer network	20.7	56.1	8.5	14.6
Telephones/voicemail in the classrooms	12.6	38.1	31.3	18
Laptop computers for teachers	9.9	38.1	30.3	21.8
Laptop computers for students	4.4	30.3	35.4	29.9

Table 3. Differences in Current Implementation of Technology (by State).

Survey Item Description	AL [a]	FL [a]	GA [a]	MS [a]	TN [a]	$\chi 2$
A computer network (LAN) within each building	38.8	29.6	75.0	24.6	76.7	62.3***
A computer network (WAN) connecting district buildings	18.5	51.9	23.8	18.3	58.5	44.9***
Internet access for teachers in the district	39.4	50.0	57.3	41.9	86.4	30.9***
Internet access for students in the district	34.3	46.2	53.9	35.5	81.8	31.8***
Internet access for administrators/staff	35.8	57.7	65.6	33.9	88.6	47.1***
A television in each classroom	61.0	76.9	78.7	67.3	48.8	16.4*
The "Channel 1" video service	76.9	66.7	76.3	94.9	70.0	16.2*
A distributed video system (e.g. DYNACOM)	22.6	47.4	64.5	3.4	8.0	61.5***
Distance learning capabilities (e.g. two-way video) between district buildings	13.5	27.3	33.8	35.3	17.1	23.4**
Computers with multimedia capabilities in each building	51.6	70.8	79.1	37.7	85.4	46.0***
Instructional computer labs in each building	66.7	77.3	80.0	72.9	51.2	21.4**
Integrated Learning Systems (e.g. Jostens, CCC)	41.2	73.9	71.1	62.5	41.2	23.6**
Electronic mail (e-mail)	32.8	60.0	52.9	23.6	76.7	38.2***
Electronic library catalog systems	67.7	72.0	92.4	35.0	57.5	64.7***
CD-ROM access in each building	68.2	87.5	91.1	55.0	93.0	45.9***
Laptop computers for teachers	2.0	20.8	23.0	4.5	8.1	20.6**
Laptop computers for students	4.2	4.8	13.1	0.0	5.7	22.4**
Laptop computers for administrators/staff	14.0	30.4	45.6	22.0	27.5	19.8*
Dial-in access to a building and/or district computer network	12.3	56.0	26.7	16.1	27.0	32.1***
Electronic classroom management software (grading, attendance, etc.)	59.4	80.0	77.3	46.8	76.2	24.8**
A satellite dish for the district	59.3	80.0	97.8	71.9	47.2	53.7***

* $p < .05$; ** $p < .01$; *** $p < .001$

[a] Numbers represent percentages of subjects responding that the survey item was currently in place in their district.

Figure 1. Percentage of respondents with written technology plans for their districts (by state).

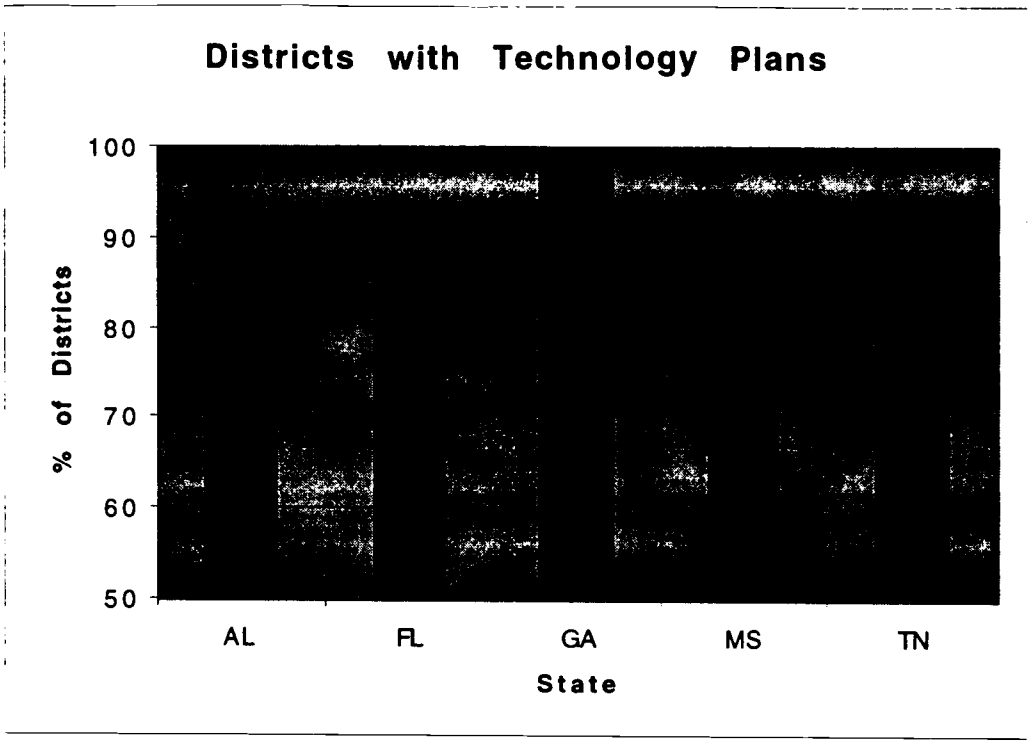
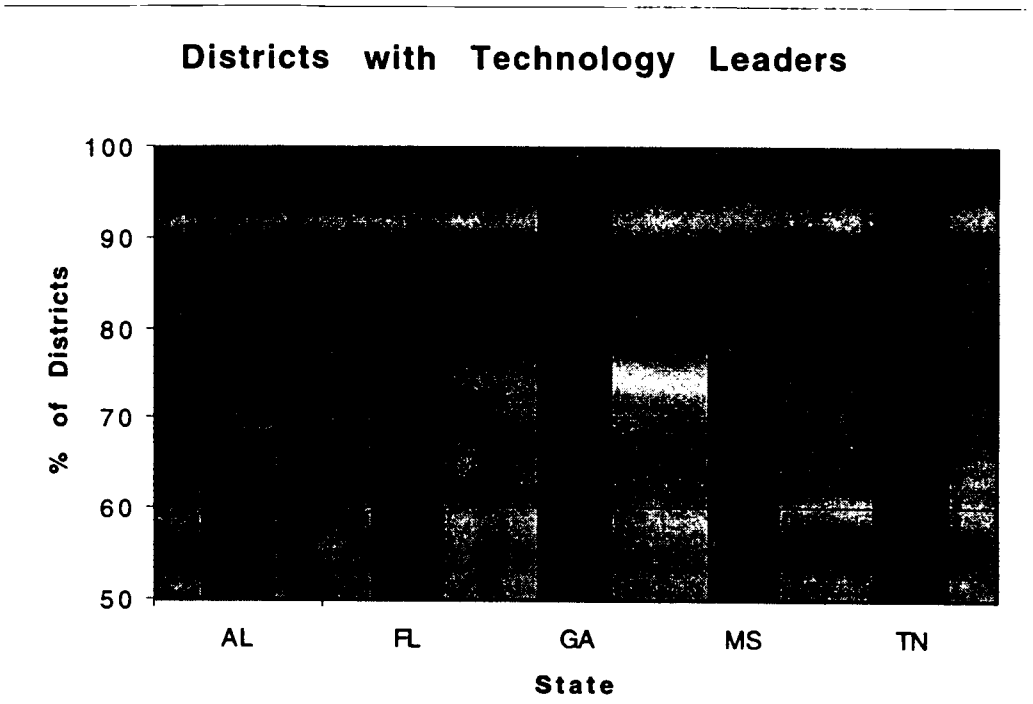


Figure 2. Percentage of respondents with technology leaders employed in their districts (by state).



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